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ON THE SPECIFIC IDENTITY OF COTYLASPIIS
INSIGNIS LEIDY AND PLATYASPIIS
ANODONTAE OSBORN.

CHARLES A. KOFOID.

Two species of trematodes belonging to the suborder *Aspidocotylea* and the family *Aspidobothridae* occur in this country as parasites of fresh-water clams. The first of these is the not uncommon *Aspidogaster conchicola*, described by von Baer ('27). This is an internal parasite infesting the pericardium, the liver, and the renal organ of many *Unionidae* of Europe and America. Its occurrence in this country was first reported by Leidy ('51, '57, and '58) in *Unionidae* from Pennsylvania. It has also been found in great abundance in various species of *Unio* and *Anodonta* from the Illinois River, examined at the Illinois Biological Station at Havana, during the last five years. On grounds which will be discussed later, Monticelli ('90) has raised the question as to the specific identity of the form reported by Leidy and the *Aspidogaster conchicola* of Europe. It seems probable, however, that Leidy had a form agreeing, in so far as he described it, with the European species as then known. My examination of the specimens from the Illinois River leaves no doubt in my mind that *Aspidogaster conchicola*, as further described by Voeltzkow and Stafford, occurs abundantly in that locality, and thus far no other species of this genus has been observed there, although over one thousand clams have been examined by Prof. H. M. Kelly and myself for these parasites. Under these circumstances the inference seems to be warranted that von Baer's *Aspidogaster conchicola* occurs in this country also, and is the common species, and the only one of the genus as yet found here.

The other trematode of this family which is a parasite of the *Unionidae*, is *Cotylaspis insignis* Leidy, and up to the present time it has been reported only from the *Unionidae* of the United

States, having been found by Leidy ('57 and '58) on *Anodonta fluviatilis* and *lacustris*, and by the writer, at the Illinois Biological Station, on *Unio alatus*, *anodontoides*, *confragosus*, *edentulus*, *elegans*, *gracilis*, *katharinae*, *ligamentinus*, *rectus*, *tuberculatus*, and on *Anodonta corpulenta*. Unlike *Aspidogaster*, it is an ectoparasite, being harbored in the mucus upon the surface of the host, upon the foot, the gills, and especially in the region of the axil and along the line of attachment of the inner gill to the body.

Ever since the publication of the original description of *Cotylaspis* there has been some question as to the standing of the genus founded to receive this one species; and, indeed, the validity of the species itself has been questioned at times. European helminthologists have assigned it various positions in the system, and have even reduced it to a synonym of *Aspidogaster conchicola*. This uncertainty and the resulting confusion in synonymy seem not to be due to the lack of illustrations and to the nature of the original description, for this, though brief, was concise, and accurate as far as it went, quite as full, indeed, as many specific descriptions by helminthologists of both continents at that day. It was rather the result of an opinion hazarded by Leidy ('58) that *Aspidogaster* and *Cotylaspis* might possibly represent "two different stages of existence of the same animal."

During the last four years the writer has had in course of preparation a paper on the structure of this interesting trematode. (See Forbes, '96.) It is the purpose of the present note merely to set forth the grounds on which Leidy's original description of the species is entitled to recognition and to discuss the synonymy briefly.

The first reference to this unique little trematode is in a brief note by Professor Leidy ('57) in the report of the proceedings of the Academy of Natural Sciences of Philadelphia for the meeting held Feb. 17, 1857. In the report of that meeting the recorder states that "Dr. Leidy made the following observations on *entozoa* found in the Naïades." (The italics are mine.) Strictly speaking, however, *Cotylaspis insignis* is an ectoparasite, as above stated, being found, as the note proceeds

to tell, "within the cleft of the upper branchial cavity, adhering to the outer surface of the renal organ and the continuous margin of the foot." The next year Dr. Leidy ('58) published the following more extended diagnosis of this new genus and species, allied to *Aspidogaster*:

Cotylaspis Leidy. — Body curved infundibuliform, anteriorly cylindro-conical, posteriorly expanding into a subcircular or oval ventral disc with numerous acetabula arranged in a triple series. Mouth infero-terminal, with a prominent upper lip, and protractile into a cup- or disc-like acetabulum. Intestinal apparatus as in *Aspidogaster*. Eyes two, distinct, black, situated on each side of the head. Generative apertures inferior, between the head and ventral disc.

Cotylaspis insignis Leidy, *Proc. Nat. Sci.*, 1857, 18. — Translucent white or pink white. Upper lip snout-like, conical. Ventral disc crenate at the margin; acetabula 29, oblong quadrate, the outer rows continuous in front and behind so as to form a circle. Length from $\frac{1}{2}$ to 1 line; ventral disc from $\frac{1}{4}$ to $\frac{1}{2}$ a line in diameter.

Habitation. — Found adhering to the outer surface of the renal organ, and the upper margin of the foot, within the cleft of the upper branchial cavity of *Anodonta fluviatilis* and *A. lacustris*.

Remarks. — This curious parasite, though allied to *Aspidogaster conchicola*, is certainly distinct; and it never occupies the locality of the latter, which also is found in the pericardium of *Anodonta fluviatilis* and *A. lacustris*. It is an interesting fact that in accordance with its exterior position *Cotylaspis* possesses well-developed eyes, while the imprisoned *Aspidogaster* is blind. It has occurred to me that perhaps these two genera may represent two different stages of existence of the same animal.

Diesing ('59), in his *Revision*, recognized Leidy's genus *Cotylaspis*, associating it with *Aspidogaster*; Taschenberg ('79) recognized the genus, according it a position in the system between *Aspidogaster* and *Aspidocotyle*; and Hoyle ('88) also accepted the genus, associating it, as Taschenberg did, with the above-named genera. In 1885 Poirer described *Aspidogaster lenoiri* from the intestine of *Tetrathyra vaillantii*, a turtle from Senegal, but did not mention its striking similarity to *Cotylaspis insignis* in the general form, structure of the ventral sucker, and the gross anatomy which he briefly describes. Monticelli ('92) established a new genus, *Platyaspis*, for this peculiar species, but, with an interrogation point, made the closely related *Cotylaspis* a synonym of *Aspidogaster conchicola*, justifying this

disposition of the species by the doubt expressed by Leidy, and expanding the original describer's suggestion into a statement that *Cotylaspis insignis* may be the young of *Aspidogaster*. Inasmuch, however, as the species described by Leidy had eyes, and the young of *A. conchicola*, as described by Aubert ('55) and by Voeltzkow ('88), are not provided with these organs, Monticelli further suggests that the form found by Leidy in the pericardium of clams upon which *Cotylaspis insignis* was parasitic, and reported by him ('57, '58) as *Aspidogaster conchicola*, may not have been that species but another — by inference undescribed — American species of *Aspidogaster*. Braun ('89-'93) follows Monticelli ('92) in assigning Poirer's species *lenoiri* to the genus *Platyaspis*, though in the explanation of Figs. 1 and 2, Taf. xx, he refers to the species as *Aspidogaster lenoiri*. Because of this double designation Prof. H. L. Osborn's ('98) statement that "Braun ('92) in Bronn's *Klassen und Ordnungen* followed his [Poirer's] assignment of the animal to that genus" (*Aspidogaster*) is correct only for the plate designation) Braun also follows Monticelli in assigning *Cotylaspis insignis* to the genus *Aspidogaster*, but admits it to the list of valid species. He also cites Leidy's paper of 1857, but quotes (p. 896) his description of 1858.

Professor Osborn ('98) has recently described as *Platyaspis anodontae* a trematode which he has found on *Anodonta* (species not given) and *Unio luteolus* from Lake Chautauqua. This is, I believe, unquestionably Leidy's *Cotylaspis insignis*. Unfortunately, Professor Osborn does not discuss the relationship of the form which he has described as new, to the species found by Leidy, and does not even mention the genus *Cotylaspis* except when, by a curious *lapsus pennae*, he substitutes *Cotylaspis* for *Cotylogaster* in his reference (p. 56) to Monticelli's "paper on *Cotylaspis* in Leuckart's *Festschrift*." I fail to see in Professor Osborn's more extended account any disagreement with Leidy's original description, and a comparison of specimens shows that he is dealing with the same form that occurs at Havana, which I have referred to Leidy's *Cotylaspis*. From Professor Osborn's account of the animal and my own observations it follows that *Cotylaspis insignis* is a sexually mature animal

and not a larval stage of *Aspidogaster conchicola*, with which, as Leidy ('57, '58) reported, it is associated. I have found the eggs, the young in various stages, and the adults of *Cotylaspis*, but no trace of any evidence to support the conjectures of Leidy ('58) and Monticelli ('92) that *Cotylaspis* is one stage in the life cycle of *Aspidogaster*. The doubt raised by Leidy ('58) and amplified by Monticelli ('92) is thus removed, and the species as originally described by Leidy ('57) should be recognized. Furthermore, the ectoparasitic habit, the presence of eyes, and the presence, *on the adult*, of a ventral sucker containing a definite number of alveoli necessitate, to my mind, the rehabilitation of the genus *Cotylaspis* to receive this species. As Stafford ('96) has shown, a variable number of alveoli may be present in the ventral sucker of *Aspidogaster* when sexually mature.

The eyes of *Cotylaspis insignis* are very prominent in the adult, and their nervous connection with the cerebral mass can readily be demonstrated with methylen blue. Osborn's statement that in trematodes eyes "are not hitherto recorded of adults" is not strictly correct, since Braun, for example ('89-'93, pp. 464, 465, and 693), cites no less than fourteen different genera of the *Monogenea*, and one of the *Digenea*, in which species occur whose adults have well-defined eyes.

Cotylaspis insignis is also peculiar in possessing, as does *Aspidogaster*, a series of so-called marginal sense organs, placed in the angles of the crenulate margin of the ventral sucker at the points where the partitions between the alveoli of the outer circle meet the outer wall. There are thus twenty of these peculiar organs in *Cotylaspis insignis*. Neither Leidy ('57, '58) nor Osborn ('98) mention these organs; they are, however, present in a specimen kindly loaned to me by the latter for comparison. The genus *Platyaspis*, as defined by Monticelli ('92) for the reception of Poirer's African species, has for one of its diagnostic characters the absence of these marginal sense organs. Poirer, however, in his original description makes no statement as to the presence or absence of these organs, and Monticelli ('92) and Braun ('89, '93) have taken this negative evidence as a warrant for their statement that the organs in question are absent. The points of contrast between the two

genera, as described, are the presence or absence of eyes, the number of alveoli in the ventral sucker (29 in *Cotylaspis* and 25 in *Platyaspis*), and the ectoparasitic habit of the one and the endoparasitic habit of the other. Here, again, the absence of eyes in *Platyaspis* is inferred from Poirer's silence upon the subject. The endoparasitic habit of *Platyaspis* may also be questioned, for turtles are wont to feed upon molluscs, and molluscan parasites have been found in the intestines of mollusc-eating vertebrates. For example, Stafford ('96) suggests on the basis of the variation in form observed by him in *Aspidogaster conchicola* that *A. limacoides* Diesing, from the intestines of European fishes, is only an *A. conchicola* which had been taken into the digestive tract of the fish with its food. Similarly I have myself found in the intestine of *Cyprinus carpio* and *Moxostoma macrolepidotum* specimens of *Aspidogaster* which externally do not differ from *A. conchicola*. Furthermore, in one instance they were found with a mass of the glochidia of *Anodonta* — a coincidence which suggests their source. However, the data at hand do not justify, to my mind, the reduction of *Platyaspis* to a synonym of *Cotylaspis*. Monticelli's genus should, for the present at least, be retained for the reception of Poirer's species. Should future investigation reduce the now considerable differences which separate the two forms, and render advisable the assignment of the two species, *C. insignis* and *B. lenoiri*, to the same genus, then Leidy's *Cotylaspis* will take precedence of Monticelli's *Platyaspis*.

I give below the synonymy of *Cotylaspis insignis*.

***Cotylaspis insignis* Leidy (1857).**

Cotylaspis insignis Leidy ('57).

Cotylaspis insignis Leidy ('58).

Cotylaspis insignis Diesing ('59).

Cotylaspis insignis Taschenberg ('79).

Cotylaspis insignis Hoyle ('88).

Aspidogaster conchicola (in part) Monticelli ('92).

Aspidogaster insignis Braun ('89-'93).

Platyaspis anodontae Osborn ('98).

In this note the aim has been to show that *Aspidogaster conchicola* occurs in this country; that *Cotylaspis insignis* Leidy

is a sexually mature form and not a stage in the life cycle of *A. conchicola* or of any other species; that on these grounds Leidy's designation is entitled to recognition; that *Platyaspis anodontae* Osborn is a synonym of *Cotylaspis insignis*; and that Monticelli's genus *Platyaspis* should not be reduced to a synonym of *Cotylaspis* from data at present available.

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